Mr. Michael T. Davis Pre-Calculus	Unit 1 Review 1.1 through 1.8 October 20, 2015

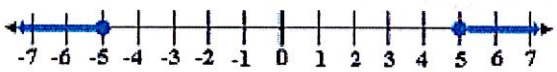
Name: Solutions

This packet does not include 1.6, 1.7 & 1.8 since we covered these sections so recently.

1.1 INTERVAL NOTATION

1) Write the domain of each graph in both **inequality** and **interval** notation.

Graph 1

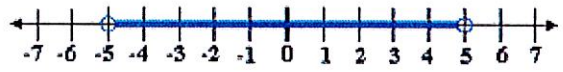


Inequality: $x \le -5$ or $x \ge 5$ Interval: $(-\infty, -5] \cup [5, \infty)$

Graph 2

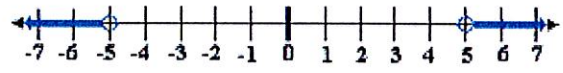
Inequality: $x < -5$ or $x > 4$ Interval: $(-\infty, -5) \cup (4, \infty)$

Graph 3



Inequality: $-5 < x < 5$ Interval: $(-5, 5)$

Graph 4



Inequality: $x < -5$ or $x > 5$
Interval: $(-\infty, -5) \cup (5, \infty)$

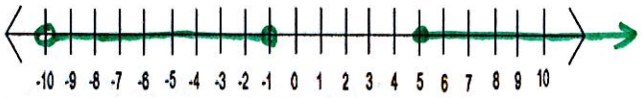
2) Graph each interval on a number line.

a. $[-3, \infty)$

b. $(-4, 5]$

c. $(-\infty, 2] \cup (2, \infty)$

d. $(-10, -1) \cup [5, \infty)$



3) Write each inequality in interval notation.

a. $-9 < x \leq 6$ $(-9, 6]$

b. $-5 \leq x < 4$ *or* $x > 8$ $[-5, 4) \cup (8, \infty)$

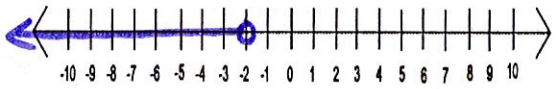
c $x < -5$ *or* $x \geq 0$ $(-\infty, -5) \cup [0, \infty)$

4) Solve each inequality. Graph the solution set on a number line, AND write the solution in interval notation.

a. $3x + 11 < 5$

$3x < -6$

$x < -2$



b. $5 - \frac{1}{3}n \leq 6$

$-\frac{1}{3}n \leq 1$

$n \geq -3$

e. $-8 \leq \frac{3}{4}p - 2 < 10$

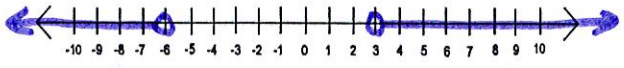
$-6 \leq \frac{3}{4}p < 12$

$-8 \leq p < 16$

f. $3x - 8 > 1$ *or* $2x + 9 < -3$

$3x > 9$ $\quad 2x < -12$

$x > 3$ $\quad x < -6$

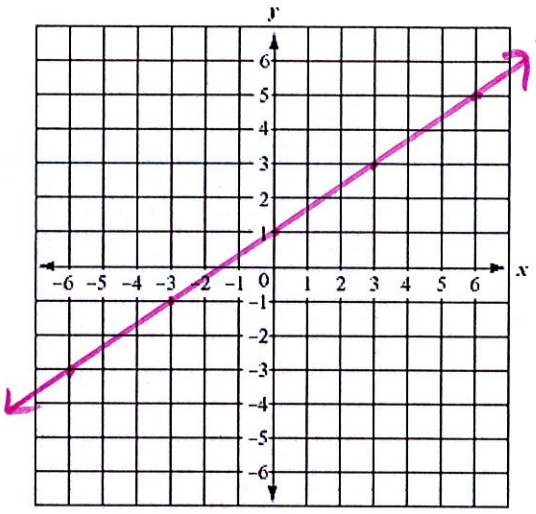


1.2 LINEAR FUNCTIONS

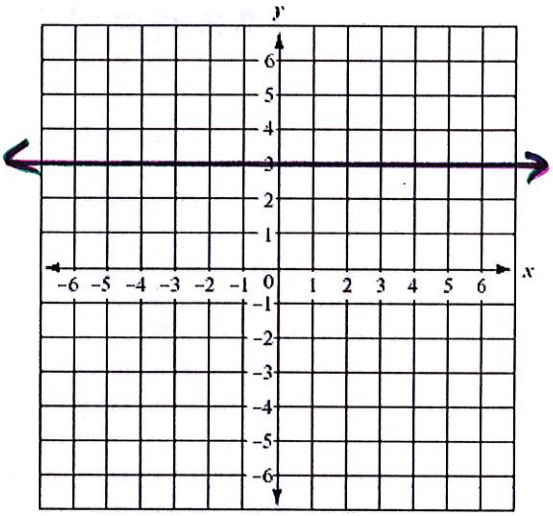
1. Suppose a cab drive charges a passenger an initial meter fee of \$2.50 just for getting in the cab. Then, she charges \$0.25 per mile after that. This is a linear function in which the cost of the ride (cab fare) is a function of distance (the number of miles that are driven). Let x represent the number of miles driven by the cab. Let C represent the cost of cab fare. Write an equation for the cost of cab fare as a function of the number of miles driven.

$C(x) = 0.25x + 2.50$

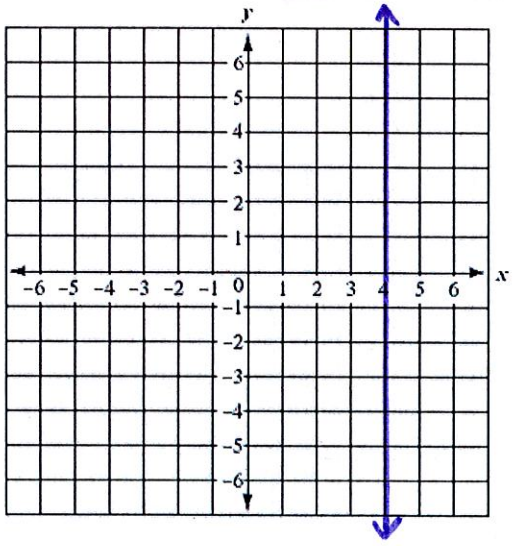
2. Graph the line with equation $y = \frac{2}{3}x + 1$



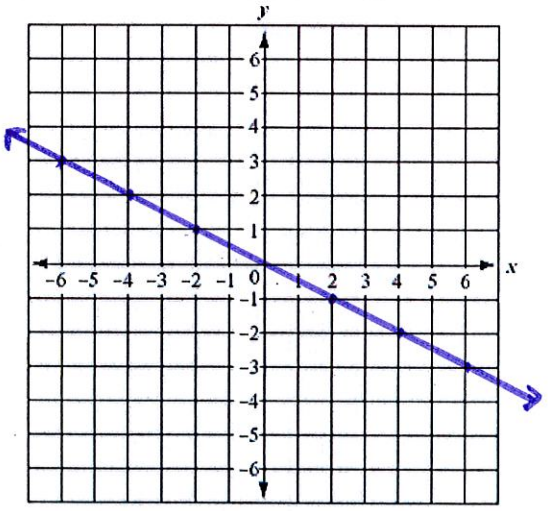
3. Graph the line with equation $y = 3$



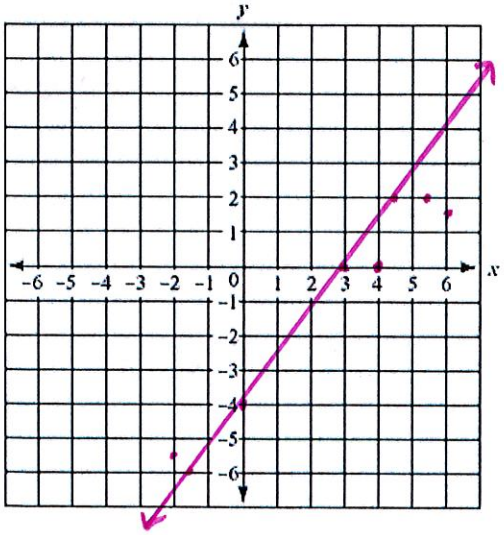
4. Graph the line with equation $x = 4$



5. Graph the line with eqtn $y = \frac{-1}{2}x$



6. Graph $4x - 3y = 12$ which is in standard form



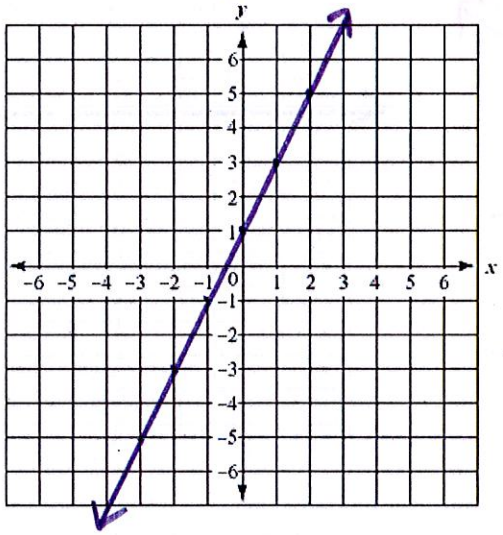
$-2x+y=1$

Given the lines shown, write an equation in slope-intercept form first then convert the equation to standard form. $y=2x+1 \rightarrow y-2x=1$

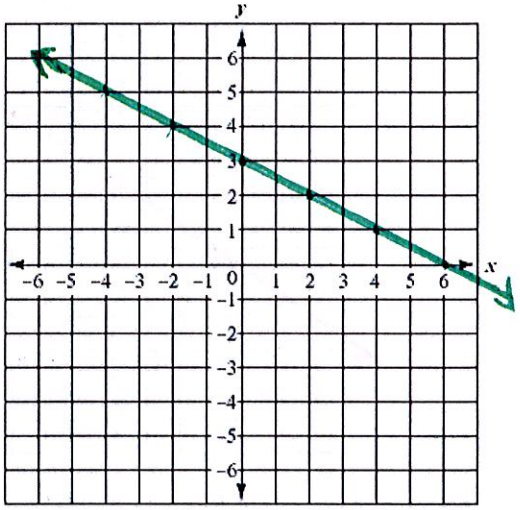
$y=-\frac{1}{2}x+3$

$x+2y=6$

6. $2x-y=-1$

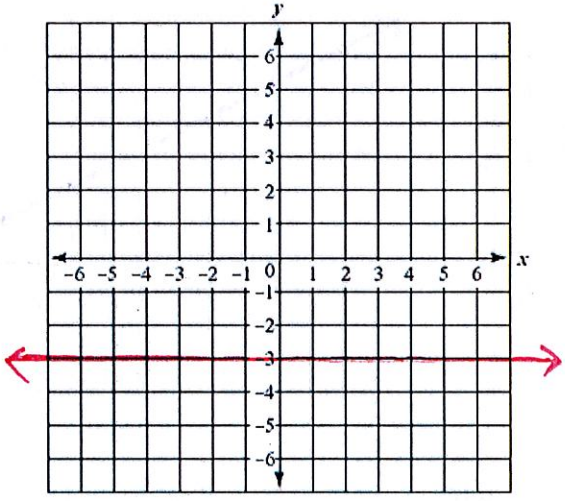


8.



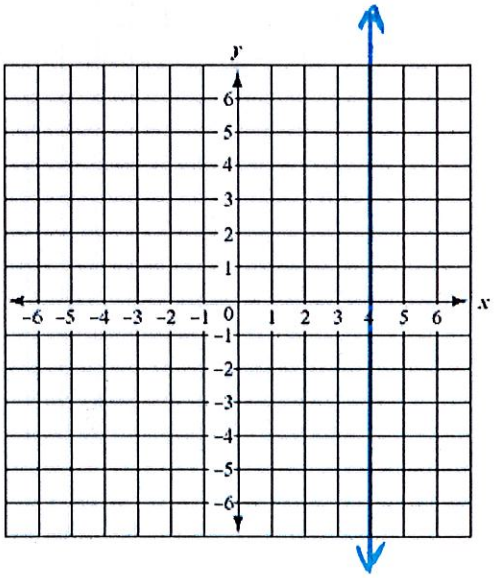
Given each line shown, write an equation in ~~point-slope form~~ first then convert the equation to ~~slope-intercept~~.

9.



$y=-3$

10.



$x=4$

$m = \frac{7-3}{9-3} = \frac{4}{12} = \frac{1}{3}$ $y-7 = \frac{1}{3}(x-9)$ $y-7 = \frac{1}{3}x-3$ $y = \frac{1}{3}x+4$

$x-3y=-12$

11. Given a line containing the points $(-3,3)$ and $(9,7)$. Find an equation of the line in slope-intercept form. Convert your equation to standard from.

12. Given a line containing the points $(4,7)$ and $(-1,7)$. Find an equation of the line.

$y=7$

13. Given a line containing the points $(3,5)$ and $(3,1)$. Find an equation of the line.

$x=3$

14. The two given equations represent lines. Are the lines parallel or Perpendicular or neither? Explain briefly why. $x+2y=5$ & $2x-y=4$

$y=-\frac{1}{2}x+\frac{5}{2}$ $y=2x-4$

lines are $\perp$ since slopes are opposite reciprocals

15. Line A has equation $y=3x+1$. Line B contains the point $(-1,-8)$ and is parallel to line A. Determine an equation for line B.

$y=3x+b$ $-8=3(-1)+b$ $-5=b$ $y=3x-5$

16. Line A has equation $y=\frac{2}{5}x-6$. Line B contains the point $(4,-9)$ and is perpendicular to line A. Determine an equation for line B.

$y=-\frac{5}{2}x+b$ $-9=-\frac{5}{2}(4)+b$ $-9=-10+b$ $b=1$

$y=-\frac{5}{2}x+1$

1.3 Bases & Exponents

Simplify each expression (do not leave any negative exponents):

1. $\sqrt[3]{64} = 4$ 2. $\sqrt[6]{64} = 2$ 3. $9^{\frac{3}{2}} = \left(9^{\frac{1}{2}}\right)^3 = (3)^3 = 27$

4. $27^{\frac{4}{3}} = (27^{\frac{1}{3}})^4$
$= 3^4$
$= 81$

5. $\frac{7^5}{7^7} = \frac{1}{7^2} = \frac{1}{49}$

6. $\frac{x^{14}}{x^6} = x^8$

7. $\frac{35x^{10}y}{5x^6y^3} = \frac{7x^4}{y^2}$

8. $\frac{x^{-2}}{x^3} = x^{-2-3}$
$= x^{-5}$
$= \frac{1}{x^5}$

9. $2x^2y^4 + 8x^2y^4 = 10x^2y^4$

10. $(2x^2y^3)^4 + (3x^4y^6)^2 =$
$16x^8y^{12} + 9x^8y^{12}$
$25x^8y^{12}$

11. $\frac{(x+y)^3}{(x+y)^2} = x+y$

12. $\left(\frac{3m^2n^7}{m}\right)^0 = 1$

1.4 Multiplying, Factoring & Solving Polynomials

1. Multiply $(x-5)^2$ $= (x-5)(x-5) = x^2-10x+25$

2. Multiply $(x+4)(x-4)$ $= x^2-4x+4x-16 = x^2-16$

3. Multiply $(2x+5)(4x-3)$ $= 8x^2-6x+20x-15 = 8x^2+14x-15$

4. Factor x^2-9x $= x(x-9)$

5. Factor $8x^2+14x-15$ $= (2x+5)(4x-3)$

6. Factor $2x^2+10x-28$ $= 2(x^2+5x-14) = 2(x+7)(x-2)$

7. Solve $x(x-8)=0$ $\{0, 8\}$

8. Solve $(x+2)(x-5)=0$ $\{-2, 5\}$

9. Solve $(2x-5)(4x+3)=0$ $\{\frac{5}{2}, -\frac{3}{4}\}$

10. Solve $x^2-5x-14=0$ $(x-7)(x+2)=0$ $\{7, -2\}$

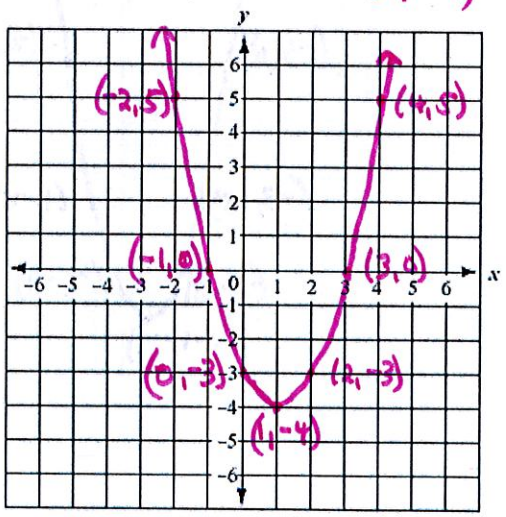
11. Solve $x^2-25=0$ $(x-5)(x+5)=0$ $\{5, -5\}$

12. Solve $6x^2+23x+20=0$ $(2x+5)(3x+4)=0$ $\{-\frac{5}{2}, -\frac{4}{3}\}$

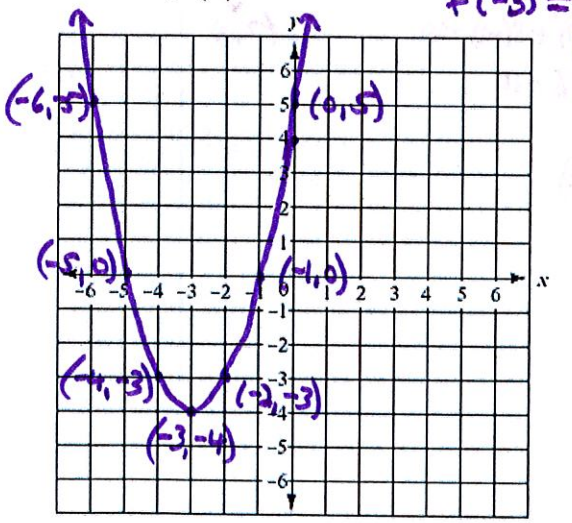
1.5 Quadratic Functions

Graph each parabola with the given quadratic equation

1. $f(x)=(x-1)^2-4$ $V(1,-4)$

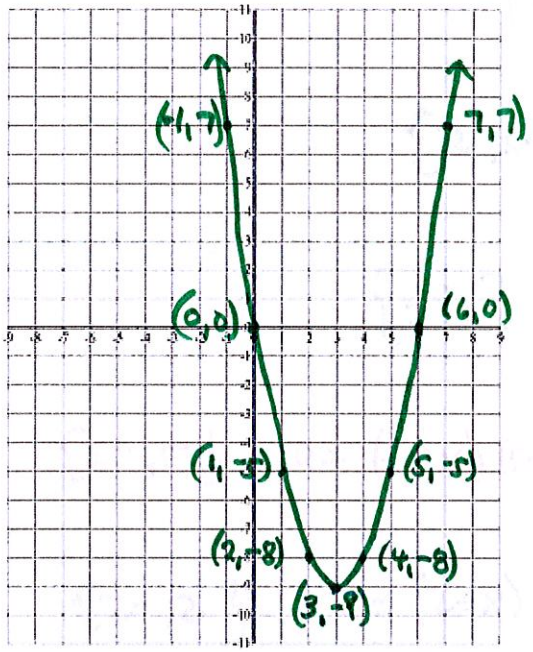


2. $f(x)=x^2+6x+5$ axis $x=-3$ $f(-3)=-4$ $V(-3,-4)$



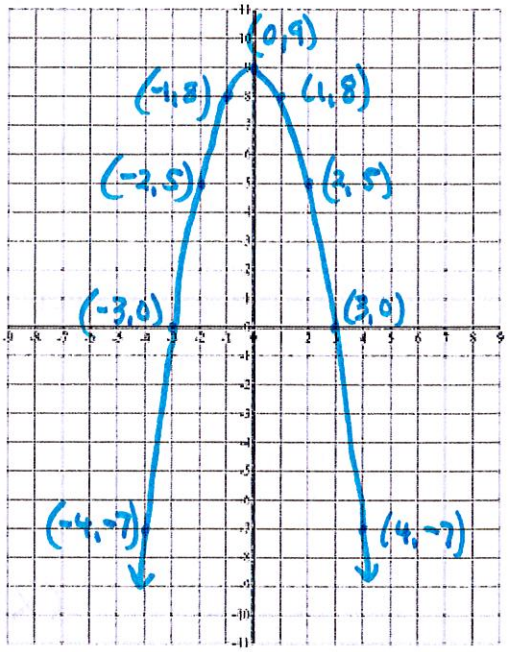
axis $x=3$ $f(3)=-9$

3 $f(x)=x^2-6x$ $= x(x-6)$



$V(0,9)$ $a=-1$

4. $f(x)=-x^2+9$



7. $f(x)=2x^2+8x+10$

$f(x)=2(x^2+4x+5)$

axis $x=\frac{-8}{4}$

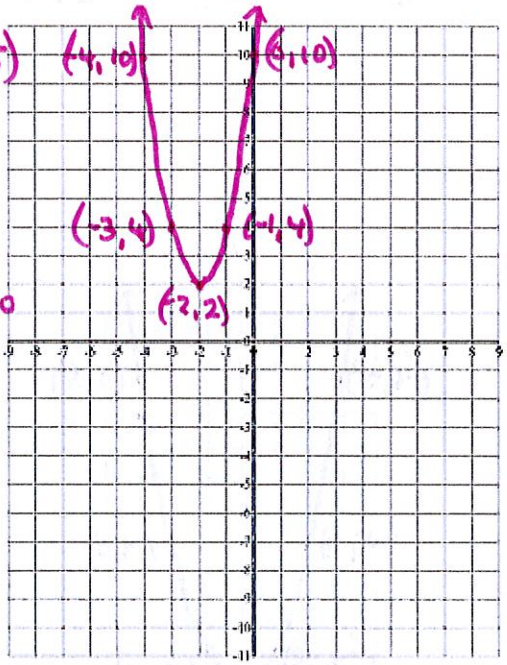
$x=-2$

$f(-2)=2(-2)^2+8(-2)+10$

$=8-16+10$

$=2$

$V(-2,2)$



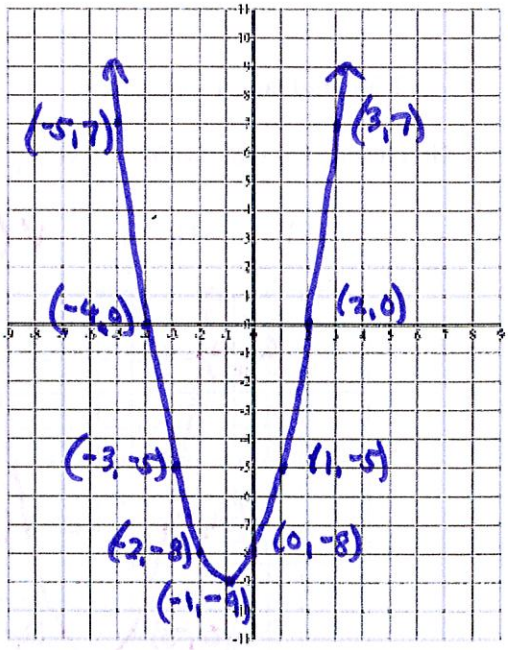
6. $f(x)=(x-2)(x+4)$

$(2,0)$ & $(-4,0)$

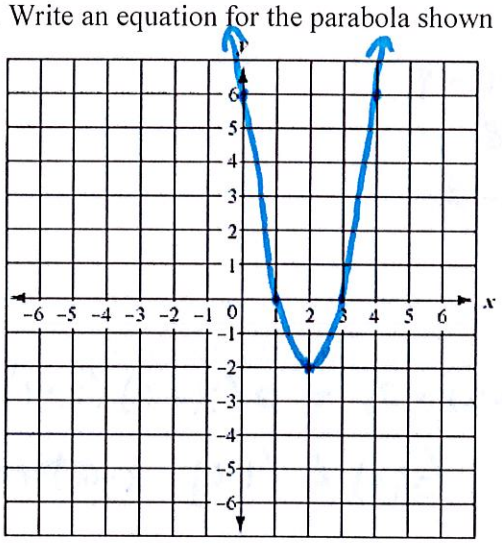
axis $x=-1$

$f(-1)=-9$

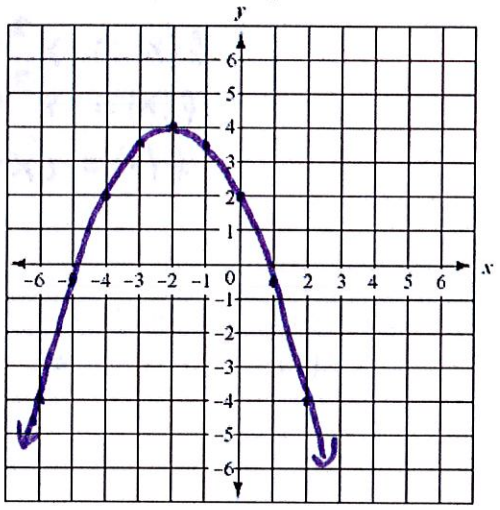
$V(-1,-9)$



7. Write an equation for the parabola shown



8. Write an equation for the parabola shown



9. Write a vertex-form equation of the parabola with vertex $V(1,10)$ and point $P(4,7)$

$f(x) = a(x-1)^2+10$

$7 = a(4-1)^2+10$

$-3 = a \cdot 9$

$\frac{-1}{3} = a$

$f(x) = \frac{-1}{3}(x-1)^2+10$

10. Write a quadratic equation in factored form given the information. A parabola contains the points $(-2,0)$, $(5,0)$ & $(1,-24)$

$f(x) = a(x+2)(x-5)$

$-24 = a(1+2)(1-5)$

$-24 = a(3)(-4)$

$2 = a$

$f(x) = 2(x+2)(x-5)$

11. Convert the quadratic equation $f(x) = x^2+6x+10$ to vertex form

axis $x = \frac{-6}{2(1)} = -3$ $f(-3) = (-3)^2+6(-3)+10 = 1$

$V(-3,1)$ $a=1$ $f(x) = (x+3)^2+1$

12. Convert the quadratic function $f(x) = \frac{1}{2}(x+4)^2+3$ to standard form

$f(x) = \frac{1}{2}(x+4)(x+4)+3 = \frac{1}{2}(x^2+8x+16)+3$

$f(x) = \frac{1}{2}x^2+4x+8+3 = \frac{1}{2}x^2+4x+11$

$f(x) = \frac{1}{2}x^2+4x+11$

13. Convert the quadratic function $f(x)=(x+1)^2-9$ to factored form

$f(x) = x^2 + 2x + 1 - 9$

$f(x) = x^2 + 2x - 8$

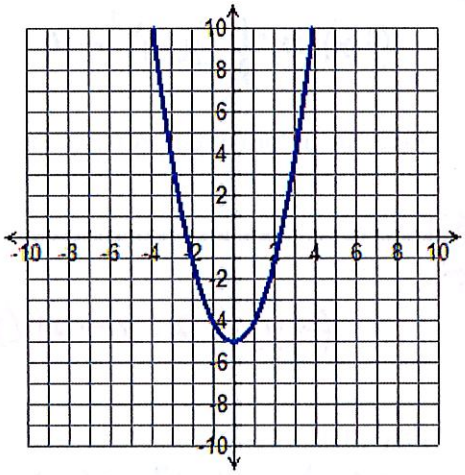
$f(x) = (x+4)(x-2)$

14. Without graphing, determine the x-intercepts of the parabola with equation $f(x)=2x^2+4x-6$ $= 2(x^2+2x-3) = 2(x+3)(x-1)$

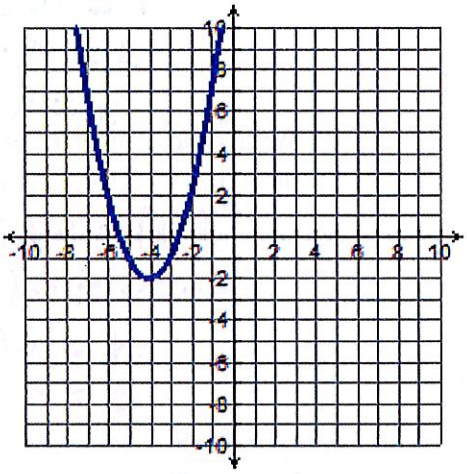
$(-3,0)$ & $(1,0)$ x-intercepts

15. For each parabola shown, write a quadratic equation in the form of your choice.

a. $f(x) = x^2 - 5$



b. $g(x) = (x+4)^2 - 2$



16. Determine the x-intercepts of the parabola with equation $g(x)=x^2-11x+24$

$g(x) = (x-3)(x-8)$

$(3,0)$ & $(8,0)$ x-intercepts

17. Determine the x-intercepts of the parabola with equation $f(x)=2x^2-9x-18$

$f(x) = (2x+3)(x-6)$

$x = -\frac{3}{2}$ $\quad$ $x = 6$

$(-\frac{3}{2}, 0)$ & $(6,0)$